CLAIMS

What is claimed is:

1. A channel equalizer of a single carrier receiver receiving an input signal, comprising:

a feed-forward filter removing a pre-ghost of respective symbols of the input signal;

a feedback filter removing a post-ghost of the respective symbols of the input signal;

an adder combining the pre-ghost removed symbol with the post-ghost removed symbol;

a level decision unit determining a level of the symbols added at the adder with reference to predetermined level data, and feeding back the determined level to the feedback filter;

a trellis decoder performing trellis decoding with respect to a sum of the symbols obtained at the adder;

an error calculator calculating an error value between the symbols obtained at the adder and the level determined at the level decision unit; and

a trellis control unit controlling the trellis decoder so that a plurality of decoded symbols output from the trellis decoder are input to the feedback filter based on the error value obtained at the error calculator.

2. The channel equalizer of claim 1, wherein the trellis control unit controls the trellis decoder so that the decoded symbols are input to the feedback filter when a signal to noise ratio (SNR) corresponding to the error value is equal to or more than a predetermined threshold.

3. The channel equalizer of claim 1, wherein the trellis decoder comprises:

a whole decoding depth as an N (N=natural number); and

a whole length of a trace back delay as an $N \times K$ (K=natural number).

4. The channel equalizer of claim 3, wherein the trellis decoder inputs to the feedback filter the decoded symbols that are output from a plurality of decoding depth states of the whole decoding depth.

5. The channel equalizer of claim 4, wherein the decoded symbols output from the decoding depth states of an n $(n \leq N,\ \ N = natural\ \ \ number)$ is input to a $1+(n \times K)th$ filter tap of the feedback filter, and the decoded symbols output from the decoding depth states are input to respectively corresponding filter taps of the feedback filter.

6. The channel equalizer of claim 1, wherein, with an input of the level determined at the level decision unit, the feedback filter removes the post-ghost from the respective symbols based on the decided level, and with another input of a decoded symbols from the trellis decoder, the feedback filter removes the post-ghost from the respective symbols based on the decoded symbols.

7. A channel equalizing method of a single carrier receiver receiving an input signal, comprising:

removing a pre-ghost from respective symbols of the input signal using a feed-forward filter;

removing a post-ghost from respective symbols of the input signal using a feedback filter;

combining the pre-ghost removed symbols with the post-ghost removed symbols;

performing a feedback operation of determining a sum of the symbols as a corresponding level with reference to predetermined level data, and inputting the determined level to the feedback filter;

computing an error between the sum of the symbols and the determined corresponding level based on a predetermined error updated algorithm;

performing a trellis decoding operation of performing trellis decoding of the symbols using a trellis decoder; and

controlling the trellis decoder to determine whether the decoded symbols output from the trellis decoder is input to the feedback filter based on the computed error.

8. The channel equalizing method of claim 7, wherein the controlling of the trellis decoder comprises:

inputting the decoded symbols from the trellis decoder into the feedback filter when a signal to noise ratio corresponding to the error value is equal to or more than a predetermined threshold.

9. The channel equalizing method of claim 7, wherein the trellis decoder in the trellis decoding operation comprises:

a whole decoding depth as N (N=natural number) ; and

a whole length of a trace back delay as an $N \times K$ (K=natural number).

10. The channel equalizing method of claim 9, wherein the trellis decoder inputs the decoded symbols output from a plurality of decoding depth states of the whole decoding depth into the feedback filter.

11. The channel equalizing method of claim 10, wherein the decoded symbols output from the decoding depth states of n, which is equal to or smaller than N, is input to a $1+(n \times K)th$ filter tap of the feedback filter, and the decoded symbols output from the decoding depth states are input to respectively corresponding filter taps of the feedback filter.

12. The equalizing method of claim 10, wherein the feedback filter removes the post-ghost from the respective symbols based on the decided level, and based on an input of the decoded symbols from the trellis decoder, removes the post-ghost from the respective symbols based on the decoded symbols.

13. A single carrier receiver receiving an input signal, comprising:

a recovery unit recovering an original signal from the input signal;

a phase recovery unit recovering a phase distortion of the input signal;

a channel equalizer performing a channel equalization with respect to symbols of the phase-distortion recovered input signal using decoded symbols in a unit of trellis decoding depth;

a de-interleaver performing de-interleaving with respect to the channel-equalized input signal from the channel equalizer; and

a reed-solomon demodulator performing reed-solomon decoding with respect to the de-interleaved input signal.

14. The single carrier receiver of claim 13, wherein the recovery unit comprises:

a demodulator converting the input signal into a base bandwidth;

a distortion compensation unit recovering a distortion of at least one of a segment synchronization signal, a field synchronization signal, and a symbol timing of the input signal in the base bandwidth; and

a comb filter removing an NTSC (National Television System Committee) interference signal from the distortion-recovered input signal.

15. The single carrier receiver of claim 13, wherein the channel equalizer comprises:

a feed-forward filter removing a pre-ghost of respective symbols of the input signal;

a feedback filter removing a post-ghost of the respective symbols of the input signal;

an adder adding the pre-ghost removed symbols with the post-ghost removed symbols;

a level decision unit determining a level of the symbols added at the adder with reference to predetermined level data, and feeding back the determined level to the feedback filter;

a trellis decoder performing a trellis decoding with respect to a sum of the symbols obtained at the adder;

an error calculator calculating an error value between the symbols obtained at the adder and the determined level determined at the level decision unit; and

a trellis control unit controlling the trellis decoder so that a plurality of decoded symbols output from the trellis decoder are input to the feedback filter based on the error value obtained at the error calculator.

16. The single carrier receiver of claim 15, wherein the trellis decoder comprises:

a whole decoding depth as N (N=natural number);and

a whole length of a trace back delay as $N \times K$ (K=natural number).

17. The single carrier receiver of claim 16, wherein the trellis decoder inputs the decoded symbols output from a plurality of decoding depth states of the whole decoding depth into the feedback filter.

18. The single carrier receiver of claim 15, wherein the trellis control unit controls the trellis decoder to input the decoded symbols output from the trellis decoder into the feedback filter when a signal to noise ratio corresponding to the error is equal to or more than a predetermined threshold.

19. The single carrier receiver of claim 18, wherein the decoded symbols output from the decoding depth states of an n $(n \leq N,\ N = natural\ \ number)$ is input to a $1+(n \times K)th$ filter tap of the feedback filter, and the decoded symbols output from the decoding depth states are input to respectively corresponding filter taps of the feedback filter.

20. The single carrier receiver of claim 15, wherein, based on an input of the determined level determined at the level decision unit, the feedback filter removes the post-ghost from the respective symbols based on the determined level, and, based on another input of the decoded symbols from the trellis decoder, the feedback filter removes the post-ghost from the respective symbols based on the decoded symbols.

21. A single carrier receiver receiving an input signal, comprising:

a channel equalizer removing a pre-ghost and a post-ghost of respective symbols of the input signal, and trellis-decoding a sum of the pre- and post-ghosts removed symbols of the input signal based on predetermined level data and the sum of the pre- and post-ghosts removed symbols of the input signal.

22. The single carrier receiver of claim 21, wherein the channel equalizer comprises:

a feedback filter removing the post-ghost of the respective symbols of the input signal; and

a feed-forward filter removing the pre-ghost of respective symbols of the input signal.

23. The single carrier receiver of claim 21, wherein the channel equalizer comprises:

a level decision unit determining a level of the symbols based on the predetermined level data, and feeding back the determined level to the feedback filter.

24. The single carrier receiver of claim 23, wherein the level decision unit determines the level of the pre- and post-ghosts removed symbols based on the predetermined level data.

25. The single carrier receiver of claim 23, wherein the feedback filter outputs the post-ghost removed symbols based on the determined level.

26. The single carrier receiver of claim 23, wherein the channel equalizer comprises:

an error calculator calculating an error value between the determined level and the sum of the pre- and post-ghosts removed symbols of the input signal.

27. The single carrier receiver of claim 26, wherein the channel equalizer comprises:

a trellis decoder trellis-decoding the sum of the pre- and post-ghosts removed symbols of the input signal based on the error value of the error calculator.

28. The single carrier receiver of claim 27, wherein the channel equalizer comprises:

a controller controlling the trellis decoder to transmit the decoded sum of the pre- and post-ghosts removed symbols of the input signal to the feedback filter.

29. The single carrier receiver of claim 28, wherein the feedback filter removes the post-ghost of the symbols of the input signal based on the decoded sum.

30. The single carrier receiver of claim 21, wherein the channel equalizer transmits the decoded sum of the pre- and post-ghosts removed symbols of the input signal to the feedback filter.

31. The single carrier receiver of claim 30, wherein the channel equalizer generates post-ghosts removed symbols of the input signal based on the error value.

32. The single carrier receiver of claim 30, wherein the channel equalizer generates the post- ghosts removed symbols of the input signal based on the decoded sum of the pre- and post-ghosts removed symbols of the input signal.

33. The single carrier receiver of claim 21, wherein the channel equalizer transmits the decoded symbols of the input signal to the feedback filter so that the feedback filter removes the post-ghost of the symbols of the input signal based on the decoded sum.

34. A method of performing a channel equalization with respect to symbols of an input signal in a single carrier receiver, the method comprising:

removing a pre-ghost and a post-ghost of respective symbols of the input signal; and

trellis-decoding a sum of the pre- and post-ghosts removed symbols of the input signal based on predetermined level data and the sum of the pre- and post-ghosts removed symbols of the input signal.

35. The method of claim 34, wherein the trellis-decoding of the sum of the pre- and post-ghosts removed symbols of the input signal comprises:

determining a level of the sum based on the predetermined level data; and

feeding-back the determined level to the feedback filter.

36. The method of claim 35, wherein the removing of the post-ghost of the respective symbols of the input signal comprises:

outputting the post-ghost removed symbols based on the determined level.

37. The method of claim 35, wherein the trellis-decoding of the sum of the pre- and post-ghosts removed symbols of the input signal comprises:

transmitting the decoded sum of the pre- and post-ghosts removed symbols of the input signal to the feedback filter based on an error value between the determined value and the sum of the pre- and post-ghosts removed symbols of the input signal.